



COMMONWEALTH of VIRGINIA

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ESCO Technical Energy and Water Savings Audit Instructions

A. Minimum Owner Conditions for ESCO

Following are the minimum conditions the Owner will accept from the selected ESCO in the Technical Energy and Water Savings Audit.

Technical Energy and Water Savings Audit Phase

1. Technical Energy and Water Savings Audit.

The ESCO's proposed contract terms must include the performance and presentation of results from a detailed Technical Energy and Water Savings Audit of a quality acceptable to the Owner. Markups provided prior to award of the Technical Energy and Water Savings Audit must be used throughout the project, provided its size and scope remain similar. If the Owner decides not to enter into an energy savings performance contract after the audit has been accepted, he agrees to pay the cost of the audit as stated in the Technical Energy and Water Savings Audit, Memorandum of Understanding (MOU) in accordance with its contract terms and conditions and under the conditions defined in Section B.2 of this document.

The ESCO will not limit its ECM recommendations to only those projects having a 12-year payback, but will give a prioritized list of all opportunities for savings, regardless of payback. The Owner may elect to buy-down the purchase and installation costs of ECMs that cannot be totally funded by energy and operations savings. The ESCO shall complete a preliminary analysis of all ECMs as described in Section E of this document. At that time shall commit funds, if available, to complete ECMs in excess of the twelve-year payback. If funds are not available, the ESCO will complete design on only the ECMs that can be funded under the twelve year program. The Technical Energy and Water Savings Audit must include estimates of savings for each measure. Also, the cost estimate for each measure must include an estimate of all component costs including engineering, design, installation, maintenance, repairs, and debt services. The Technical Energy and Water Savings Audit must include all calculations and the sources of the cost estimates used in the study.

2. Allowable Savings.

Allowable savings to be used throughout the Technical Energy and Water Savings Audit will include energy and water savings, owner materials and commodity savings, including scheduled replacement of parts, and outside labor cost savings. Savings calculations usually do not include owner in-house labor costs or owner deferred maintenance costs, and will be determined on a project-by-project basis. Escalation rates and interest rates are open for negotiations in calculating savings projections.

3. *Energy Savings Projections.*

All energy savings projections used throughout the Technical Energy and Water Savings Audit will be presented in terms of energy usage and costs. Any cost savings related to maintenance and operation of the facilities will be rigorously reviewed and, if agreed to, will be limited to those that can be thoroughly documented and approved by the Owner.

4. *Use of Stated Cost Markups.*

The pricing methodology and individual cost markups disclosed during preliminary contract negotiations will be expected to be applied in costs presented in any subsequent technical audit or performance contract, providing the scope and size of the project remain the same as assumed when markups were disclosed.

5. *Professional Architect/Engineer Involvement.*

A registered professional engineer in the Commonwealth of Virginia must review and approve design work done under this contract and be involved throughout the process of auditing, design, construction, installation, and measurement and verification. The professional engineer is responsible for compliance with the Construction and Professional Services Manual on design documents and applicable review processes for state agency projects. All work shall conform to the Virginia Uniform Statewide Building Code, latest edition and revision for state agency projects. Local governments will have their own requirements.

Execution of the Audit

1. *Technical Energy and Water Savings Audit*

The ESCO agrees to perform a Technical Energy and Water Savings Audit in accordance with the Scope of Work described below. The ESCO agrees to complete the Technical Energy and Water Savings Audit and present the Owner with a final report within 90 calendar days or less as agreed to between the Owner and Contractor from the execution of the Technical Energy and Water Savings Audit, Memorandum of Agreement.

The Owner agrees to assist the ESCO in performing the Technical Energy and Water Savings Audit in accordance with the Scope of Work described below. The Owner agrees to work diligently to provide full and accurate information. The ESCO agrees to work diligently to assess validity of information provided and to confirm or correct the information, as needed.

The ESCO will submit a completed Technical Energy and Water Savings Audit, along with a proposal of Energy Performance Contract terms and conditions based on the recommended package of energy and water savings measures selected by the ESCO. The proposal will include details as specified in the Scope of Work below.

2. *Compensation to the ESCO*

Except as provided for below, within 60 days after the Owner's acceptance of the ESCO's final submission of the Technical Energy and Water Savings Audit report, the Owner shall compensate the ESCO for performance of the Audit by payment to ESCO of the amount agreed to in the Technical Energy and Water Savings Audit, Memorandum of Understanding.

- A. The Owner shall have no payment obligations at the time of the execution of the Technical Energy and Water Savings Audit, Memorandum of Understanding, but acknowledges that the fee indicated in the agreement shall be incorporated into the ESCO's project costs, in the event the ESCO and the Owner

execute an Energy Performance Contract within 60 days, or such longer period as the parties may mutually agree, after acceptance of the final Technical Energy and Water Savings Audit report.

- B. Should the ESCO determine at any time during the Technical Energy and Water Savings Audit that the savings cannot be attained to meet the Owner's twelve-year payback term as set forth in the RFP, the Technical Energy and Water Savings Audit will be terminated by written notice of the ESCO to the Owner. In this event, the Technical Energy and Water Savings Audit, Memorandum of Understanding shall be cancelled and the Owner shall have no obligation to pay, in whole or in part, the amount specified.
- C. The Owner shall have no payment obligations under this agreement in the event that the ESCO's final Technical Energy and Water Savings Audit report does not contain a package of energy and water savings measures which, if implemented, will provide the Owner with guaranteed cash savings to be sufficient to fund the Owner's payments of all costs and fees associated with the Energy Performance Contract, including any annual fees to the ESCO, less any cash payment the Owner may choose to contribute. *(The "back of the envelope" 85% rule applies to these savings. Your "back of the envelope" has to be 85% or greater of the amount of savings used for the payback options. The payback options have to cover the payment obligations.)*

3. Scope of Work

The Technical Energy and Water Savings Audit shall be performed as described below:

- A. **Establish allowable costs and savings factors approved for consideration by the Owner.** The ESCO will use the following to develop savings estimates.
1. Savings estimates may include:
 - A. Energy and water savings
 - B. Owner materials/commodity savings, including scheduled replacement of parts
 - C. Outside labor cost savings, including maintenance contracts
 - D. Offset of future Owner capital costs
 2. The following items may be negotiated:
 - A. Owner in-house labor costs
 - B. Owner deferred maintenance costs
 - C. Escalation rates for natural gas, electricity, water, and materials/commodities
 - D. Interest rates
 3. The following markup costs are disclosed to provide the Owner with typical project costing approaches for a project of similar scope and size. It is expected that these rates will be used in the Technical Energy and Water Savings Audit and subsequent Energy Performance Contract.

Provide the following pricing information below as it applies to this project:

<u>Cost Category</u>	<u>Percent of Project Construction Cost</u>
Overhead	_____
Profit	_____
Markups on subcontractors	_____
Markups on equipment/supplies/rentals	_____
Design	_____
Construction Management	_____
Commissioning	_____
Monitoring and Verification	_____
Other categories used by ESCO	_____

Project Services**Hourly Rates**

Licensed electrical engineer	_____
Licensed mechanical engineer	_____
Project manager for construction	_____
CADD	_____
Technical writer	_____
Estimator	_____
Other	_____
Other	_____

B. Collect data and background information from the Owner. The Owner will provide facility operations and energy use data for the most recent three years from the effective date of the Technical Energy and Water Savings Audit, Memorandum of Agreement, as follows:

1. Building square footage
2. Construction date of building and major additions
3. Utility company invoices
4. Occupancy and usage information
5. Description of all energy-consuming or energy-savings systems used on the premises, as available
6. Description of energy management procedures utilized on the premises
7. Description of energy-related improvements made or currently being implemented
8. Description of any changes in the structure of the facility or energy- or water-using systems
9. Description of future plans regarding building modifications or equipment modifications and replacements
10. Drawings, as available (may include mechanical, plumbing, electrical, building automation and temperature controls, structural, architectural, modifications, and remodels)
11. Original construction submittal and factory data (specifications, pump curves, etc.), as available
12. Operating engineer logs, maintenance work orders, etc., as available
13. Records of maintenance expenditures on energy-using equipment, including service contracts
14. Prior Technical Energy and Water Savings Audits or studies, if any.

The Owner agrees to work diligently to furnish the ESCO, upon request, accurate and complete data and information as available. Where information is not available from the Owner, the ESCO will make a diligent effort to collect such information through facility inspections, staff interviews, and data from utility companies.

The ESCO agrees to work diligently to assess validity of information provided and to confirm or correct the information, as needed.

C. Perform a facility inspection

1. Interview the facility manager, maintenance staff, or others regarding:
 - a. Facility operations, including energy management procedures
 - b. Equipment maintenance problems
 - c. Comfort problems and requirements
 - d. Equipment reliability
 - e. Projected equipment needs, etc.
 - f. Occupancy and use schedules for the facility and specific equipment
 - g. Facility improvements, past and planned.
2. Inspect major energy-using equipment, including:
 - a. Lighting (indoor and outdoor)
 - b. Heating and heat distribution systems

- c. Cooling systems and related equipment
 - d. Air distribution systems and equipment
 - e. Outdoor ventilation systems and equipment
 - f. Exhaust systems and equipment
 - g. Hot water systems
 - h. Electric motors, transmission and drive systems
 - i. Other energy-using systems
 - j. Water consuming systems (restroom fixtures, water fountains, irrigation systems, etc.).
3. Perform “late-night” surveys outside of normal business hours and on weekends to confirm building systems and occupancy schedules.
 4. Develop a preliminary list of potential energy and water savings measures. Consider the following for each system.
 - a. Comfort and maintenance problems
 - b. Energy use, loads, proper sizing, efficiencies, and hours of operation
 - c. Current operating conditions
 - d. Remaining useful life
 - e. Feasibility of systems replacement
 - f. Hazardous materials and other environmental concerns
 - g. Owner’s future plans for equipment replacement or building renovations
 - h. Facility operations and maintenance procedures that could be affected

D. Establish base year consumption and reconcile with end use consumption estimates.

1. Examine utility bills for the past three years and establish base year consumption for electricity, gas, steam, water, etc., in terms of energy units (kWh, kW, ccf), and in terms of dollars per unit. Describe the process used to determine the base year (averaging, selecting most representative contiguous twelve months, etc.). Consult with facility personnel to account for any anomalous schedule or operating conditions on billings that could skew the base year representation. ESCO will account for periods of time when equipment was broken or malfunctioning in calculating the base year.
2. Estimate loading, usage, and/or hours of operation for all major end uses representing over five percent of total facility consumption, including, but not limited to:
 - a. Lighting
 - b. Heating
 - c. Cooling
 - d. HVAC motors (fans and pumps)
 - e. Plug loads
 - f. Kitchen equipment
 - g. Other/miscellaneous

Where loading or usages are highly uncertain (including variable loads such as cooling), the ESCO will use its best judgment, spot measurements, or short-term monitoring. The ESCO should not assume that equipment run hours equal the operating hours of the building or rely on facility staff estimates.

3. Reconcile estimated annual end-use consumption with the annual base year consumption to within five percent for electricity, fuels, and water. The miscellaneous category can be no greater than five percent. This reconciliation will place reasonable limits on potential savings.
4. State how future plans for the building may affect the baseline energy and water usage and how the baseline will be adjusted.

5. ESCO should list factors that may be adjusted, such as cooling degree days (CDD), heating degree days (HDD), square footage changes, or changes to operating hours, etc.

E. Develop a preliminary analysis of potential energy and water savings measures and other building services.

This list shall be compiled and submitted to the Owner within 60 days of the execution of the Technical Energy and Water Savings Audit, Memorandum of Understanding and should:

1. Identify measures that appear likely to be cost effective and, therefore, warrant detailed analysis.
2. For each measure, prepare a preliminary estimate of energy or water cost savings including description of analysis methodology, supporting calculations, and assumptions used to estimate savings.

F. Meet with the Owner to present preliminary findings prior to thorough analysis.

Describe how the projected project economics meet the Owner's terms for completing the Technical Energy and Water Savings Audit, Memorandum of Understanding. Discuss assessment of energy use, savings potential, retrofit opportunities, and potential for developing an energy performance contract. Develop a list of recommended measures for further analysis.

G. Analyze savings and costs for each energy and water savings measure.

The ESCO should:

1. Consider technologies from a comprehensive perspective including, lighting systems, HVAC equipment and distribution systems, building envelope systems, motors, kitchen equipment, renewable energy systems, and water savings devices.
2. Follow the methodology of ASHRAE, the International Performance Measurement & Verification Protocol (IPMVP), or other nationally-recognized authorities and be based on the engineering principles identified in the description of the retrofit option.
3. Utilize assumptions, projections, and baselines which best represent the true value of future energy or operational savings. Include marginal costs for each unit of savings that are accurate at the time the audit is performed, documentation of material and labor cost savings, adjustments to the baseline to reflect current conditions at the facility, and calculations which account for the interactive effects of the recommended measures. Do not double-count the savings which result from individual measures, when calculating the total savings. Show input data used in developing the model baseline.
4. Use the best judgement regarding the employment of instrumentation and recording durations so as to achieve an accurate and faithful characterization of energy use.
5. Use the markups and fees stated above, where applicable, in all cost estimates.
6. Develop a preliminary measurement and verification plan for each measure.
7. Follow additional guidelines for analysis and report preparation, given below.

H. Prepare a draft Technical Energy and Water Savings Audit Report.

The primary purpose of the report is to provide an engineering and economic basis for negotiating a potential Energy Performance Contract between the Owner and the ESCO. The report shall be completed within 90 days of the date of execution of the Technical Energy and Water Savings Audit, Memorandum of Understanding. The report shall include:

1. Overview

- a. Contact information.
- b. Summary table of recommended energy and water savings measures, with an itemization of each measure for design and construction costs, annual maintenance costs, the first year cost avoidance (in dollars and energy units), simple payback, and equipment service life.
- c. Summary of annual energy use and costs of existing or base year condition.
- d. Calculation of cost savings expected if all recommended measures are implemented. Include total percentage savings.
- e. Description of the existing facility, mechanical, and electrical systems.
- f. Summary description of measures, including estimated costs and savings for each, as detailed above.
- g. Discussion of measures considered but not investigated in detail.
- h. Conclusions and recommendations.

2. Full description of each energy and water savings measure, including:

- a. Written description:
 1. Existing conditions.
 2. Recommendations. Include a discussion of facility operations and maintenance procedures that will be affected by installation/ implementation. Present the plan for installing or implementing the recommendations.
- b. Base year energy use:
 1. Summary of all utility bills
 2. Base year consumption and how established
 3. Plan for reconciling end-of-the-year results with base year figures.
 4. End year reconciliation with base year (include discussion of any unusual findings).
- c. Savings calculations:
 1. Base year energy use and costs
 2. Projected post-retrofit energy use and costs
 3. Savings estimates, including analysis methodology, supporting calculations, and assumptions used
 4. Conclusions, observations, and caveats
 5. Savings estimates must be limited to energy use and dollar savings allowed by the Owner, as described above
 6. Percent cost-avoidance projected
 7. Description and calculations for any proposed utility rate changes
 8. Explanation of how savings interactions between retrofit options is accounted for in calculations
 9. If computer simulation is used, include a short description and state key input data. Show all input data in the Appendix. If requested by Owner, access will be provided to the program and all assumptions and inputs used, and/or printouts shall be provided of all input files and important output files and included in the Technical Energy and Water Savings Audit with documentation that explains how the final savings figures are derived from the simulation program output printouts.
 10. If manual calculations are employed, formulas, assumptions, and key data shall be stated.
- d. Cost estimates. Detailed scope of the construction work needed, and in a form that is suitable for cost estimating. Include all anticipated costs associated with installation and implementation, including:
 1. Engineering and design costs.

2. Contractor/vendor estimates for labor, materials, and equipment; include special provisions, such as overtime, etc., as needed to accomplish the work with minimum disruption to the operations of the facilities.
3. Permit costs
4. Construction management fees
5. Commissioning costs
6. Other costs/fees
7. Company overhead/profit
8. Environmental costs of disposal, handling of hazardous materials, etc.
9. Note that all markups and fees stated in the Technical Energy and Water Savings Audit, Memorandum of Understanding shall be used in the cost estimates, unless otherwise documented and justified (due to changes in scope or size of project or other unforeseen circumstances).
10. Conclusions, observations, and caveats.

e. Other:

1. Estimate of average useful service life of equipment.
2. Preliminary commissioning plan.
3. Preliminary measurement and verification plan, explaining how savings from each measure is to be measured and verified (stipulated by agreement, utility bill analysis, end-use measurement and verification calculations, etc.).
4. Discussion of impacts that facility would incur after contract ends. Consider operations and maintenance impacts, staffing impacts, budget impact, etc.
5. Develop an operations and maintenance plan.
6. Develop a training plan for building operators.
7. Develop a training plan for building occupants.

3. Complete appendices that document the data used to prepare the analyses. Describe how data were collected.

I. Meet with the Owner to present the Technical Energy and Water Savings Audit findings.

J. Revise audit as directed by the Owner.

K. Prepare a proposed Performance Contract Agreement.

Prepare a Project Performance Contract Agreement in anticipation of the ESCO and the Owner entering into an Energy Performance Contract to design, install, and monitor selected energy and water savings measures, proposed in the Technical Energy and Water Savings Audit, to include:

1. Project Cost—the total amount the Owner will pay for the project and the ESCO's services. Costs must be consistent with maximum markups and fees established above. Costs may include, but are not limited to:
 - a. Engineering, designing, packaging, procuring, installing the measures (from the Technical Energy and Water Savings Audit Report results).
 - b. Financing (based on interest rates likely available to Owner).
 - c. Performance/payment bond costs.
 - d. Cost of the guarantee.
 - e. Construction management fee.
 - f. Maintenance fees.
 - g. Commissioning costs.
 - h. Monitoring fees.
 - i. Training fees.
 - j. Legal services.
 - k. Overhead and profit margins not included above.
2. A List of Services that will be provided, as related to each cost noted above.

L. Prepare a preliminary analysis of energy performance contract terms to include:

1. List of energy and water unit and dollar savings measures included in the recommended package.
2. Interest rates used in the analysis.
3. Expected contract terms (in number of years).
4. Analysis of annual cash flow for the Owner during the contract term.
5. Explanation of how savings will be calculated and adjusted, due to weather (such as heating or cooling degree days), occupancy changes, or other factors.